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IS 9414-1-2 (1979): Detail specification for digital integrated circuits, Part 1: Nand gate, TTL, Section 2: Dual 4 input, positive [LITD 5: Semiconductor and Other Electronic Components and Devices]

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IS : 9414 (Part I/Sec 2) - 1979

(Reaffirmed 2006)

Indian Standard

DETAIL SPECIFICATION FOR DIGITAL INTEGRATED CIRCUITS

PART I NAND GATE, TTL

Section 2 Dual, 4 Input, Positive

Semiconductor Devices and Integrated Circuits Sectional Committee, LTDC 10; Panel for Integrated Circuits, LTDC 10/P 6 [Ref: Doc: LTDC 10 (72)]

1. Scope — Covers two types of NAND gates based on their operating temperature range and other electrical characteristics (Type 1* and Type 2†) are covered by this standard.

1.1 Refer to IS : 7441 (Part I)-1974 'Essential ratings and characteristics of digital integrated circuits: Part I General format'.

1.2 The assigned type number shall be prominently displayed on the device.

2. Description

Category of device	Digital combinatorial
Configuration	Transistor-transistor-logic (TTL)
Function	Positive NAND gate
Gates per package	Two
Inputs per gate	4 Inputs
Outputs per gate	1 Output
Technology used	Bipolar
Constructional detail	Monolithic
Material	Silicon

3. Outlines and Connections

3.1 *Outlines and Encapsulation*

Type of Device	Outline	Encapsulation
Type 1	Under consideration	Ceramic
Type 2	IS : 5000 (OD 15) - 1973*	Ceramic or plastic

*Dimensions of semiconductor devices and integrated circuits: Device outline OD 15.

3.2 *Logic Diagram and Connections* — The logic diagram and pin connections shall be as given in Fig. 1.

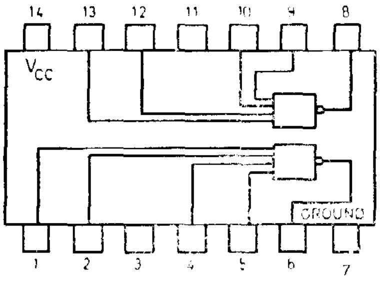

FIG. 1 PIN CONNECTIONS

4. Functional Specification

4.1 *Block Diagram* — The block diagram is shown in Fig. 2.

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*Type 1 corresponds to commercial type 5420.
†Type 2 corresponds to commercial type 7420.

Adopted 13 August 1979

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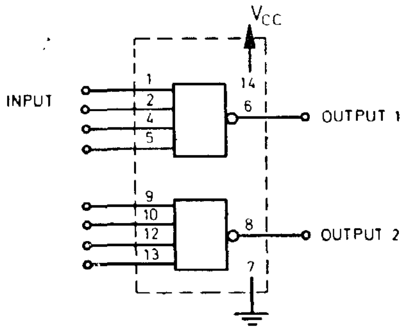

FIG. 2 BLOCK DIAGRAM

4.2 *Schematic Diagram* (*Each Gate*) — The schematic diagram of each gate is shown in Fig. 3.

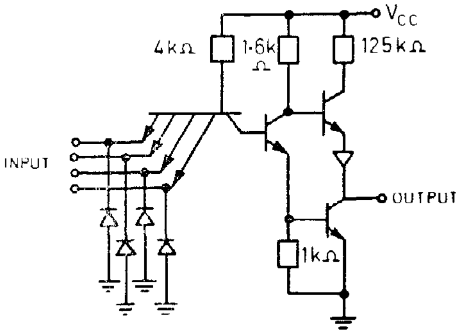

FIG. 3 SCHEMATIC DIAGRAM

Note — The components and values are given only as an example.

4.2.1 The details of the schematic diagram should always be specified or indicated by the manufacturer.

4.3 *Function* — *See* Table 1.

TABLE 1 FUNCTION

Input 1	**Input 2**	**Input 3**	**Input 4**	**Output**
(1)	(2)	(3)	(4)	(5)
H	*H*	*H*	*H*	*L*

Note — All other combinations of *H* and *L* at the input give *H* output.

H = High state, most positive (least negative).

L = Low state, least positive (most negative).

5. Ratings (Absolute Maximum)

5.1 *Electrical Ratings*

Rating	*Value*		*Remarks*
	Max	*Min*	
Supply voltage V_{CC}	+7·0 V	−0·5 V	These voltages are with respect to ground terminal
Input voltage V_{IN}	+5·5 V	−1·5 V (At high level input current I_{IH} of 12 mA *Max*)	

5.1.1 *Conditions for recommended operation*

a) Supply voltage

Type of Device	*Supply Voltage* V_{CC} Volts		
	Min	*Nom*	*Max*
Type 1	4·5	5·0	5·5
Type 2	4·75	5·0	5·25

b) Output loading capability (fan out), $N = 10$ *Max*

5.1.2 *DC noise margins*

$M_1 = V_{IHA} - V_{OHA} =$ Not applicable
$M_2 = V_{OHB} - V_{IHB} =$ 400 mV
$M_3 = V_{ILA} - V_{OLA} =$ 400 mV
$M_4 = V_{OLB} - V_{ILB} =$ Not applicable

Note — For explanation of the symbols given above, refer to **10.1** of IS : 7441 (Part I) - 1974.

5.2 *Temperature Ratings*

a) *Operating temperature*

Type 1	−55°C to +125°C
Type 2	0°C to +70°C

b) *Storage temperature*

Type 1 Type 2	−65°C to +150°C

c) *Junction temperature*

Type 1 Type 2	175°C

d) *Thermal resistance (junction to case)*

Type 1	0·03°C/mW
Type 2	0·08°C/mW

5.3 *Power Dissipation* (*Typical*)

Type 1	40 mW/gate at 50 percent duty cycle
Type 2	10 mW/gate at 50 percent duty cycle

5.4 *Marking* — Refer to **6** of ' Indian Standard general requirements and classification of tests for micro circuits (*under preparation*) '.

6. Electrical Characteristics — Refer IS : 9414 (Part I/Sec 1)-1979 ' Detail specification for digital integrated circuits: Part I Nand gate, TTL, Sec 1 Single, 8 input, positive '.

7. Environmental Data — Refer IS : 9414 (Part I/Sec 1)-1979.

8. Tests — Refer IS : 9414 (Part I/Sec 1)-1979.

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